A COMPARISON OF TWO MEASURES OF ORAL READING FLUENCY

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Abstract

Reading fluency is an important part of the process of learning to read. It is commonly assessed by the use of Curriculum-Based Measurement (CBM) techniques; however, a new assessment method emerged in the Woodcock-Johnson Tests of Achievement- Third Edition (WJ-III). Only one previous study had examined the validity of the Reading Fluency test from the WJ-III by comparing it to established CBM measures of reading fluency for a sample of third-grade students. The resulting correlation between the two measures supported the validity of the WJ-III Reading Fluency test, but it was unclear as to the two tests' relationship across grade levels. To address this question, the current study examined the relationship between the Dynamic Indicators of Basic Early Literacy Skills test of Oral Reading Fluency (DORF), a standardized CBM-type measure, and the WJ-III Reading Fluency test with students from grades one, three, and five. Results supported the use of the WJ-III Reading Fluency test as a valid measure of reading fluency across grade levels.

Literature Review

The Importance of Reading

Reading is a life-long necessity. Street signs and menus are read daily, return policies are spelled out on the backs of receipts, and applications for employment require careful reading in order to support the individual's or family's needs. Reid and Chhabra (2004) stated, "students who do not learn to read will have difficulty mastering academic content, succeeding in school, and fulfilling their life potential" (p. 12). The value of literacy is deeply embedded within every aspect of society; thus, it must be at the forefront of the educational process from the very beginning.

For many reasons, learning to read is of utmost importance for children in the school system. As a child progresses through the academic curriculum, more and more areas become increasingly dependent on his or her ability to fluently read and comprehend written text. For example, a child must be able to read his or her social studies textbook to get the information for the test; the directions for the science project may only be written format, which will require careful reading in order for the project to work properly; and in mathematics, the numbers are often written as words that the child must decipher in order to arrive at the correct response. It becomes more and more evident as the child moves through the educational system how reading becomes an essential element for academic success. Not only are basic reading skills highly and significantly correlated with academic performance across the curriculum, but they are also highly and significantly correlated with tests of written expression and standardized tests of achievement, which are often included in state-mandated assessments of entire schools and districts (Espin & Deno, 1993).

It is understandable that the ability to read is closely linked to academic performance, but there are additional negative outcomes associated with illiteracy that may be more distressing. For instance, Torgesen (2004) reported on studies that have found up to 85% of juvenile offenders appearing in court, 60% of all prison inmates, 75% of the unemployed, and 33% of recipients of Aid to Families of Dependent Children are illiterate. With these striking statistics, it is not hard to see why the United States has put so much emphasis on helping all children learn to read at grade level by the end of grade three through legislation entitled the No Child Left Behind Act. In an initiative called *Reading First,* the federal government has currently allocated approximately five billion dollars to the quest of teaching all children from kindergarten to grade three how to read (Torgesen, 2004).

Learning to Read

As children enter the classroom for the first time, either in preschool, Head Start, or kindergarten, they are surrounded by a text-rich environment, despite many having yet to learn to read a single word, and some even lacking the ability to recognize the letters of the alphabet. A lack of emergent literacy skills at this point will likely be detrimental to the development of more complex literacy skills, thus affecting a student's ability to perform well in the classroom. After letters and their corresponding sounds, or phonemes, lessons may begin to focus on frequently used words, often termed sight words, before work is begun on improving accurate and fluent decoding and finally, comprehension (Bloom, 1986; Torgesen, 2004).

The purpose behind the physical act of reading is to draw meaning from the text (Torgesen, 2004). In order for this to occur, certain prerequisite skills and knowledge of

language itself are necessary. First, one must have an understanding of oral language, which starts to develop even before a child begins to speak on his or her own. Second, one must possess the skills necessary to decode written text into a form representative of oral language. Language comprehension relies on an awareness of linguistic elements, such as semantics (e.g., the concept that sentences are made up of separate words), syntax (e.g., each sentence requires a noun and a verb), phonology (e.g., the ability to recognize differences in sounds that distinguish one word from another), and background or content knowledge of the presented topic. A deficit in any of these areas will result in reading comprehension deficits (Whitehurst & Lonigan, 1998; Wren, 2000).

Reading also requires skills in decoding, which relate specifically to the written text on the page (Whitehurst & Lonigan, 1998; Wren, 2000). As noted by Wren (2000), grapheme or letter knowledge is "the ability to recognize and manipulate the units of the writing system" (p. 20). Knowledge of letters is normally the first skill to emerge, and it is often observed as the naming of the individual letters that make up the English alphabet. Next to develop is an awareness of the distinct phonemes or sounds of letters. There must exist an understanding that each letter systematically represents a specific sound, which may combine and blend with other letters and sounds in various ways to make up spoken language (Bloom, 1986). For beginning readers in English, decoding of the phonemes must occur through the use of two distinct knowledge bases: cipher knowledge, a direct translation from letter to sound, and lexical knowledge, the ability to recognize exceptions and irregularities of the conventional cipher decoding processes (Wren, 2000). Lexical knowledge is continually being built upon as even the highly fluent and experienced reader comes across unfamiliar words that may require the

knowledge of the exception rules of decoding. In addition to letter, word, and sound knowledge, there must also exist print knowledge; that is, for English text we read from left-to-right and top-to-bottom.

Learning to read and reading are similar but distinct processes. A beginning reader who is still in the process of learning must actively apply all of the knowledge and skills discussed (e.g., decoding letters into separate sounds followed by blending to create a fluent sound), consuming much conscious effort and leaving little room for comprehension. However, as a reader becomes more competent and practiced, many of the processes that were once consciously engaged become less recognizable and are performed more subconsciously, thus allowing more awareness to be devoted to drawing meaning from the text (LaBerge & Samuels, 1974; Wren, 2000).

Oral Reading

There are three primary components of reading that are discussed repeatedly in the literature: (a) phonological processes, which include decoding skills, (b) oral fluency, and (c) comprehension (Bloom, 1986; Torgesen, 2004). In the development of phonological skills, children make use of increasingly advanced decoding methods. They begin by using symbolic decoding, which relies more on context (e.g., "cookie" written on the cookie jar). The child would not be able to recognize the word "cookie" if he or she encountered it on a menu or in a book. As the child is exposed to more written text that is not directly associated with a symbol, he or she may begin to detect frequently used words by noticing their shape or some unique feature. These words, commonly referred to as sight words, are committed to memory and become easily recognized when encountered in written text (Bloom, 1986; Wren, 2000). Once a better awareness of the

letter-sound connection has been attained, the child will begin to use the cipher knowledge to decode new words letter-by-letter, sound-by-sound. Finally, lexical knowledge emerges as the child becomes familiar with and can apply decoding skills to the common irregularities that occur in the English written language (Wren, 2000).

Somewhere in the midst of cipher and lexical knowledge development, the focus of reading turns to improving the oral smoothness or fluency of this decoding process. Fluency may be simply defined as "rapid decoding" (Shinn, Good, Knutson, Tilly, & Collins, 1992, p. 460). However, it is more precisely characterized as the speed, accuracy, and the use of proper prosodic elements that work together to transform written text into something more like what one might hear in oral language. Hence, the goal of fluency is for the child to read aloud as he or she would talk, taking into consideration the setting, mood, and other contextual factors embedded within the written text (Rasinski, 2004).

Finally, after fluency has been attained, the emphasis for the child becomes the idea of comprehension, or the ability to draw meaning from the text and the whole reason behind reading in the first place (Torgesen, 2004). A child who has reached a mastery-level of reading is able to perform multiple tasks (i.e., decoding and comprehending) simultaneously because the conscious focus has turned away from the decoding elements and toward the linguistic structure and content of the text (Bloom, 1986; Samuels & Flor, 1997). In summary, the components of reading build upon each other in a developmental fashion - speed and accuracy in decoding lead to fluency, and fluency allows attention to be focused on the subject matter and comprehension to take place.

Early 20th century models of reading attainment recognized only two factors: 1) the decoding processes involved in phonological development and 2) comprehension, with a one-way, direct causal relationship between the two (Shinn et al., 1992). That is, comprehension was facilitated by decoding, but not vice versa. Over 70 years would pass before fluency would emerge as an important element of literacy development (Clay, 1969; Clay & Imlach 1971; LaBerge & Samuels, 1974). Later, it was suggested that fluency be considered a separate goal of reading and that fluency could be improved with explicit training (Allington, 1983).

Components and Development of Reading Fluency

Reading fluency may be divided into three distinct components, each of which may be assessed by a unique method. The first is accuracy in word decoding. This involves sounding out words within text and the use of phonics skills. The emphasis here is on the correctness and thus may be assessed by counting the number of words read correctly in a specified amount of time, then dividing that by the total number of words read to determine the percentage of words read correctly. Rasinski (2004) suggests that in order for the reader to be regarded as "adequate," he or she should achieve 90-95% accuracy.

The second element of reading fluency is automatic processing, or automaticity, which is closely related to decoding as well (Bloom, 1986; Rasinski, 2004; Samuels & Flor, 1997). This component, however, is focused on the mental effort that is devoted to decoding. Automaticity is defined as the "ability to perform complex skills with minimal attention and conscious effort" (Samuels & Flor, 1997, p. 107). The idea is that the less time and effort one has to put toward the task of decoding the letters and sounds, the

more mental capacity is left for drawing meaning from the text (LaBerge & Samuels, 1974). Practicing with repeated readings helps develop the skills of automatic processing by allowing greater exposure to the formation of orthographic codes, or the distinct shapes of words, which will be used and enhanced to allow for decoding on a visual basis (Nathan & Stanovich, 1991). Automaticity may be assessed in the same manner as accuracy in decoding, but with this, one is only interested in the rate of decoding, determined by the total number of words read correctly in the allotted time, typically one minute.

The final component of reading fluency is that of prosodic reading (Schreiber, 1980), or how one sounds as they read text aloud (e.g., pausing at commas, breaking sentences and phrases up appropriately, using proper volume and pace). Assessments of prosodic reading are typically qualitative in nature, rather than quantitative.

An awareness of the separate components of fluency is critical when assessing the beginning reader. Accuracy in decoding is not the equivalent of automaticity, and believing this could be detrimental to the slower learners in a class (LaBerge & Samuels, 1974; Nathan & Stanovich, 1991). When fast learners reach automaticity, their ability to decode requires little conscious effort, but their slower counterparts may only be at the accuracy stage of learning to read. Thus, while on the surface it may appear that all students are in the same phase of reading, it is only the fast learners that actually have the ability to comprehend and apply what they have read. They have made the process of decoding an automatic one, requiring less mental effort and attention to be paid to the phonics and lexical makeup of the passage, whereas their slower classmates may only appear to be fluent readers with little room for comprehension.

Reading Fluency's Link to Comprehension and Overall Reading Competence

LaBerge and Samuels (1974) were among the first to describe the important link between reading fluency and comprehension. Further studies have supported their findings and offered an explanation as to why this association occurs. A slow, disfluent reading rate impedes one's ability to draw meaning from text by requiring available memory to be used for decoding rather than storing new information (Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003; Perfetti, 1985; Rupley, Wilson, & Nichols, 1998). A teacher may use reading fluency as an indicator of overall reading ability because a low reading rate is a reflection of both poor decoding skills and insufficient comprehension (Jenkins et al., 2003; Rasinski, 2000). Thus, reading fluency could then be used as a quick approach for making placement decisions (Lipson & Lang, 1991).

Through a phenomenon known as the Matthew Effect, children who have strong reading skills from the start are likely to grow as readers and do well in all academic areas, while those who struggle with reading are more prone to reject reading, thus putting themselves at an even greater disadvantage not only in reading but with academics in general (Stanovich, 1986). The term, Matthew Effect, comes from a saying in the Book of Matthew in the Bible that states, in essence, the rich get richer and the poor get poorer.

Specific training by the teacher in oral reading fluency through the use of repeated and assisted readings has been shown to produce significantly higher scores in comprehension measures for both non-disabled and learning disabled students (Reutzel & Hollingsworth, 1993; Therrien, 2004). Repeated reading requires the student to read and reread a short passage or story with emphasis on increasing speed and accuracy with each

attempt. In assisted reading, the teacher or a skilled peer reads the passage first to demonstrate what fluent oral reading sounds like. The process continues until the struggling reader has reached the predetermined criteria of words per minute and percent accuracy.

The evidence supports the link between reading fluency and comprehension in other ways as well. In one study examining the criterion-related validity of reading fluency, measures of reading fluency were correlated .91 with the Stanford Achievement Test (SAT) comprehension score (Fuchs, Fuchs, & Maxwell, 1988). Such a correlation was significantly higher than correlations between the SAT comprehension score and other direct measures of reading comprehension. Furthermore, Good and Jefferson (1998) summarized other studies that examined concurrent, criterion-related validity between curriculum-based measurement (CBM) measures and other measures of overall reading competence for children in grades two through six. They reported median validity coefficients ranging from .62 to .73 and concluded that reading fluency may be a more valid indicator of overall reading ability than any other measure available.

Similarly, Shinn et al. (1992) conducted a study with 238 students from the third and fifth grades using CBM procedures to assess reading fluency. They compared two CBM reading fluency probes to the Literal Comprehension measure from the Stanford Diagnostic Reading Tests. Their results indicated a correlation of .90 between reading fluency and overall reading competence. Correlations were .57 and .58 with the 114 third grade students, while the correlations were .60 and .62 for the 124 fifth grade students.

Support for the importance of reading fluency also comes from high prediction ability (both success and failure) on state-mandated tests (Rasinski, 2004; Sargent, 2002;

Stage & Jacobsen, 2001). In an examination of the reading fluency of high school students, Rasinski (2004) and his colleagues found that "variations in reading fluency accounted for approximately 30% of the variance in the students' performance on Ohio's High School Graduation Test" (p. 50). Additionally, Sargent (2002) revealed a correlation of .61 ($p < .05$) between fifth-grade students' scores on a CBM assessment of reading fluency and the Oklahoma Criterion Referenced Test of Reading. Finally, Stage and Jacobsen (2001) reported a positive predictive power of .41 and a negative predictive power of .90 when using a cut-score of the lowest 10% of scores on an assessment of reading fluency in September as a predictor of students' performance (pass or fail) on the Washington Assessment of Student Learning reading assessment given in May.

Assessing Reading Fluency

As previously stated, fluency has not always been viewed as an integral part of reading. Fuchs, Fuchs, Hosp, and Jenkins (2001) reported that between 1929 and 1960, about 20% of available reading assessment measures included some form of reading fluency assessment, and by the early 1970's that number had dropped to only 6%. Sattler's (2001) review of norm-referenced achievement tests suggests that very few individually administered standardized tests of achievement included a measure of reading fluency until recently.

There are generally three methods used in the assessment of reading fluency. One, being very informal, unstandardized, and qualitative in nature, involves listening to the student read a passage aloud while making a judgment call on the prosodic elements of the reading (Fuchs et al., 2001). The examiner may listen for correct pausing, stresses, pitch, and self-corrections (Clay, 1969; Clay & Imlach, 1971). The concept behind this

type of assessment relies on the assumption that one's ability to fluently decode written text will be evident through the quality of prosodic elements of the oral presentation and its similarity to common spoken language (Samuels & Flor, 1997; Shinn et al., 1992). Obviously, such an unstandardized measure of reading fluency provides results of questionable reliability and validity.

A second form of reading fluency assessment is through direct reading of passages as part of Curriculum-Based Measurement (CBM). One such tool for this type of assessment is the Dynamic Indicators of Basic Early Literacy Skills ([DIBELS] Good & Kaminski, 1996). Reading fluency is determined with quantitative data by assessing the number of words read correctly in a one-minute period of time. Administration and scoring procedures are standardized. As previously discussed, this is a measure of automatic processing, or automaticity. This direct measure of reading fluency may also offer valuable information on the qualitative aspects of reading much like that gained through assessing prosodic elements (Fuchs et al., 2001). The trained examiner may listen for consistent types of errors in decoding, the strategies the student applies in decoding, and the ability to self-correct.

The Woodcock-Johnson Tests of Achievement - Third Edition ([WJ-III] Woodcock, McGrew, & Mather, 2001) introduced a new method of reading fluency assessment. The Reading Fluency test on the WJ-III measures the student's ability to quickly read sentences and decide if the sentence is true or false. The student is allowed three minutes to complete as many items as possible. After subtracting the number of errors from the number of correct responses, the resulting number serves as an indicator of the student's reading fluency. Because the test is timed, it is assumed that reading

fluency is an important variable in a student's performance. Poor performance, however, could also be due to a lack of reading comprehension or other limitations such as slow cognitive processing speed or poor fine motor abilities.

Purpose

It appears only one published study has examined the relationship between CBM-type reading fluency measures and the WJ-III Reading Fluency test. Ardoin et al. (2004) gave both instruments to a sample of 77 third-grade students and a correlation of .73 was obtained. However, Ardoin et al. noted that it was not clear whether the WJ-III Reading Fluency test was a better measure of reading fluency or reading comprehension. Futhermore, Ardoin et al. stated future research should examine whether there are differences in regard to what the test is measuring based on the age of the student.

The primary purpose of this study, then, was to determine if differences in correlations existed across grade levels, which may reveal a difference in what the test is measuring at varying ages. The age of the student is important because a young student (e.g., first grade) is mainly focusing on decoding as he or she reads, while an older student (e.g., fifth grade) is more likely to have automaticity established; thus, he or she is likely more focused on comprehension. Previous studies have noted that as gains in reading fluency begin to level off around fourth grade, there tends to be a decreased correlation between reading fluency scores and reading comprehension scores or overall reading competence (Fuchs, Fuchs, Hamlett, Walz, & Germann, 1993; Shinn et al., 1992). Thus, if the WJ-III Reading Fluency test were a measure of reading comprehension rather than reading fluency, it would be expected that the correlation

between that test and a CBM-type measure of reading fluency would decrease across subsequent grades.

The second purpose of this study was to help further establish the WJ-III Reading Fluency test's validity as a measure of reading fluency by comparing it to an established measure of reading fluency, the Dynamic Indicators of Basic Early Literacy Skills test of Oral Reading Fluency (Good & Kaminski, 1996). Ardoin et al. (2004) provided support for the WJ-III Reading Fluency test at the third-grade level. This study seeks to examine the concurrent validity of the WJ-III Reading Fluency test using a broader range of elementary-aged students.

To assess the impact of grade level upon the relationship between the DIBELS Oral Reading Fluency and WJ-III Reading Fluency tests, both tests were administered to students in grades one, three, and five. The following research questions were addressed:

1. Are there differences in regard to what the WJ-III Reading Fluency test is measuring based on the grade level of the student? Significant variations in correlations across grade levels would suggest there are differences in what the test is measuring.
2. Is the WJ-III Reading Fluency test a valid measure of reading fluency across grade levels? Convergent validity would be demonstrated by the results showing strong, significant correlations at all grade levels.

Method

Participants

All participants attended the same public elementary school serving 535 students grades kindergarten through fifth grade in a small, rural southwestern city in Kentucky. The student body was predominately Caucasian (90%), with African American students making up 8% of the student population, while the remaining 2% consisted of Hispanic, Asian, and students of mixed ethnic backgrounds not otherwise specified. Approximately 51% of the student population received free or reduced lunch, suggesting a relatively low socioeconomic status for many of the students. The student population was rather evenly divided among males (49%) and females (51%). Mean ages for participants were 6 years, 10 months, 9 years, and 11 years for first-, third-, and fifth-grade students, respectively.

Three out of a possible five first-grade classes, two out of a possible four third-grade classes, and three out of a possible four fifth-grade classes were chosen based on ethnic representation to participate in the study. This original pool included 160 students who were afforded the opportunity to serve as participants.

On the day that the letters of parental/guardian consent were collected, consent was received from 43% (n = 24) of first-grade students and 50% (n = 26) of fifth-grade students. No consent forms were collected from third-grade students due to a miscommunication with the third-grade teachers contacted, which resulted in no consent forms being sent home to parents or guardians. The two original third-grade teachers were instructed to send home revised packets to the students in their homeroom class which would allow them the opportunity to participate in the study on a later date. First-

and fifth-grade students for whom consent had been given participated in the study on the first day of testing scheduled on January 5, 2005. Because a minimum of 25 students at each grade level was desired, 36 additional parent/guardian letters and consent forms were dispersed to the two remaining first-grade classes, giving those students the opportunity to participate in the study on the second day of testing scheduled on February 4, 2005. Upon collection of the second set of consent forms from the first and third grades, 56% (n = 29) of the pool of students from the third grade were given parental/guardian permission to participate. An additional eight students were added to the first-grade sample for a total participation of 35% (n = 32) of all first-grade students at this elementary school. Details on gender, ethnicity, and age of the participants are reported in Table 1.

Table 1

Demographic Characteristics of Participants by Grade

	Grade One (n = 32)	Grade Three (n = 29)	Grade Five (n = 26)
Gender			
Male	41%	52%	31%
Female	59%	48%	69%
Ethnicity			
Caucasian	94%	93%	96%
African American	6%	7%	4%
Other	0%	0%	0%
Age (years:months)			
Mean	6:10	9:0	11:0
Range	6:3 to 7:8	8:4 to 9:11	10:3 to 12:2

Instruments

DIBELS. The DIBELS test of Oral Reading Fluency (DORF) uses standardized probes and administration procedures based on a CBM model as a test of automatic processing and fluency with connected text (Good & Kaminski, 1996). Probes are administered individually and are available beginning in the winter of the first grade through the spring of the sixth grade. Reading passages are assigned based on the grade level of the student. CBM measures of oral reading fluency have yielded test-retest reliabilities ranging from .92 to .97 and alternate form reliabilities ranging from .89 to .94

for elementary students (Marston, Tindal, & Deno, 1983). Criterion-related validity coefficients of CBM measures of oral reading fluency ranged from .52 to .91 across eight separate studies conducted during the 1980's (Good & Jefferson, 1998).

The DORF uses CBM oral reading fluency procedures and requires each student to read aloud three grade-level standardized passages for one minute each. The administration and scoring of the passages are conducted in a standardized manner. Omitted words, incorrectly pronounced words, substitutions, and hesitations of greater than three seconds are scored as errors. Self-corrected errors made within three seconds are given full credit, and extra words are ignored, receiving no credit. The total number of correctly read words within the one-minute time limit serves as the reading fluency rate (Good, Kaminski, & Dill, 2002).

WJ-III Reading Fluency. The Reading Fluency test of the Woodcock-Johnson Test of Achievement - Third Edition is a standardized measure used for determining the rate and accuracy of reading ability in individuals from age six to adulthood. It is one of 22 tests that make up the entire battery of achievement tests on the WJ-III, which assesses basic skills, fluency, and application in the areas of Reading, Mathematics, and Written Language (Woodcock et al., 2001). The Reading Fluency test was normed on 1,166 individuals, ages six to eleven, with internal consistency reliability coefficients ranging from .87 to .90 (McGrew & Woodcock, 2001).

The Reading Fluency test requires the examinee to read, either silently or aloud, short statements and make a decision as to whether or not the statements are true or false by circling either Y (yes) or N (no), respectively (Woodcock et al., 2001). The allotted time for this test is three minutes. The number of errors is subtracted from the number of

correct responses for the final raw score. This test may only be scored through the use of the accompanying computer software, thus making it impossible to determine the exact derivation of scores or produce accurate alternate-form reliabilities (Sattler, 2001).

Procedure

After obtaining Human Subjects Research Board approval (see Appendix A), the Superintendent of the school system gave written permission for the study to be conducted within the school district (see Appendix B). Next, the elementary school principal was provided with a written description of the study's procedures and goals to obtain her verbal permission to proceed. Teachers from each of the selected first-, third-, and fifth-grade classes were contacted via letter (see Appendix C) to obtain access to their classrooms. Those teachers received enough packets for each child in their homeroom classes. Participants were acquired by sending a packet containing a letter to the parent or guardian of each child. The packet contained a letter explaining the study and a consent form that was to be signed and returned (see Appendix C). Upon returning the signed consent form, each child, regardless of whether or not permission was granted by the parent or guardian, received a Western Kentucky University pencil. Finally, those students with parental/guardian permission to participate were read, or read themselves, an assent form for their voluntary participation (see Appendix C).

Examiners included a second-year school psychology graduate student (thesis author) and a psychology professor, both of whom had previous experience with administration of the two assessment measures utilized. Two senior undergraduate psychology students who volunteered to assist with the study received a three-hour training session on both assessment measures conducted by the psychology professor and

assisted by the school psychology graduate student. The training included having the undergraduate students conduct multiple practice administrations of the WJ-III Reading Fluency test to the trainers and practice with the DORF measure through the use of three pre-recorded readings of passages that were to be scored. The volunteers were also given copies of the standardized administration directions for both measures to rehearse prior to the study date. In addition, all test administrations on both study dates were audio recorded in order to check for accuracy and inter-rater reliability.

On the assessment days in the elementary school, each student was individually escorted to the testing location. Each student was read or read themselves the prepared assent form. After assent was given, administration of the two measures proceeded. Assent was obtained from one hundred percent of the students. The test administered first (i.e., DORF or WJ-III Reading Fluency test) was counterbalanced to control for any possible order effects.

DORF passages were randomly chosen from the DIBELS Progress Monitoring booklet corresponding to the appropriate grade. The standardized directions were read aloud to the student as the passage was placed on the table in front of him or her. The time started when the student began reading. After one minute, the examiner said, "Stop" and a bracket was drawn on the examiner's protocol after the last word read. Each word read correctly within the allotted time was given one point. The median score of the three passages served as the DORF reading rate.

For the WJ-III Reading Fluency test, the examinee was presented with the test booklet and the standardized directions were read aloud by the examiner. The standardization procedures included four practice items that were administered first to

ensure the student understood what was expected of him or her. If the student was unable to independently complete at least three of the practice items, a raw score of zero was recorded and testing on this measure was discontinued. At the examiner's prompt, the student began to read the short statements and circled either Y for yes if the statement was true, or N for no if the statement was false. The initial directions given did not specifically indicate whether the statements were to be read aloud or silently, but if the student did begin to read aloud, he or she was directed only once to read silently. At the end of three minutes, the examiner said, "Stop, put your pencil down." After completing both measures of reading fluency, the student was promptly escorted back to class.

Results

The WJ-III Reading Fluency test may be scored using age-based or grade-based norms with the test's accompanying scoring software. However, because nine first-grade students and one third-grade student received a raw score of zero on the WJ-III Reading Fluency test, raw scores were also used in the calculation of correlations. The use of raw scores was necessary due to the inability to obtain a scaled score if the subject received a raw score of zero on this measure. The raw score was derived from the number of items answered correctly minus any items answered incorrectly. Pearson correlations between the raw scores of the two measures were used to determine the strength of the relationship between the DORF and WJ-III Reading Fluency test. Pearson correlations were also determined between the DORF score and the age-based and grade-based scores of the WJ-III Reading Fluency test for comparison purposes. Inter-rater reliability of scoring on the DORF passages was assessed with the use of the audio tapes. Inter-rater reliability was determined to be at 86% (n = 22).

Correlations between each of these sets of scores and the DORF scores are reported for each grade level in Table 2. The results indicate that the DIBELS Oral Reading Fluency test and the Woodcock-Johnson III Reading Fluency test are strongly and significantly ($p < .01$) correlated at all three grade levels assessed. Previous studies indicated there is a decline in the strength of the relationship between reading fluency and reading comprehension starting around the fourth grade (Fuchs et al., 1993; Shinn et al., 1992). Therefore, a statistical comparison was made between the correlations at third and fifth grade. The Test for Differences between Correlations from Independent Samples

Table 2

Correlations between DIBELS Oral Reading Fluency and the WJ-III Reading Fluency test for First-, Third-, and Fifth-Grade Samples

Grade	Raw Scores		Age-Based		Grade-Based	
	r	n	*r*	n	*r*	n
First	.889	32	.745	23	.848	23
Third	.934	29	.901	28	.904	28
Fifth	.853	26	.845	26	.839	26

Note. WJ-III is the Woodcock-Johnson Test of Achievement, Third Edition. All correlations were significant at the .01 level (2-tailed) using Pearson correlations.

indicated no significant difference between the correlation at third grade and the correlation at fifth grade ($z = 1.47$; $p > .05$).

Further analysis was completed using the Test for Differences between Correlations from Independent Samples to compare the results of the Ardoin et al. (2004) correlation between the WJ-III Reading Fluency test and curriculum-based measures of reading fluency for third-grade students ($r = .73$, n = 77) to the correlation obtained in this study for third-grade students using raw scores ($r = .93$, n = 29). This analysis revealed the current results for third grade to be a significantly higher correlation ($z = 3.33$; $p < .05$) than the correlation found by Ardoin et al.

Discussion

Only one previous study (Ardoin et al., 2004) was found that compared established measures of reading fluency to the relatively new format of assessing reading fluency found in the WJ-III Tests of Achievement. Although the obtained correlation in that study was strong (.73), the authors concluded that it was still unclear as to what the WJ-III Reading Fluency test was actually measuring (e.g., reading fluency or comprehension), especially considering the strong link that has been established between reading fluency and comprehension (Fuchs, Fuchs, & Maxwell, 1988; Good & Jefferson, 1998; Reutzel & Hollingsworth, 1993; Shinn et al., 1992; Therrien, 2004). Ardoin and colleagues also questioned how the correlations might differ if the two measures were compared across grade levels. Thus, the primary purpose of this study was to determine if the correlations found in Ardoin et al.'s study could be replicated and also if they would hold true across grade levels.

The correlations for third-grade students in this study did in fact support those of Ardoin et al. (2004) and, furthermore, were significantly higher. The differences in the correlations for third-grade students in the present study versus Ardoin et al.'s study may have been a result of the sample size and composition. Only 29 students from grade three were included in the present study compared to Ardoin et al.'s 77, providing fewer data for analysis. There was also greater diversity in Ardoin et al.'s sample (77% free or reduced lunch; 44% minority), which may or may not have affected the overall results. It is also important to note that the lowest performing readers were not included in the Ardoin et al. study and correlations were determined by comparing the CBM scores to the scaled score received on the WJ-III Reading Fluency measure. The present study,

however, did include the lowest level readers by using the WJ-III Reading Fluency raw scores (i.e., number of correct items) as a means of comparison because scaled scores were unattainable when participants received a raw score of zero. Thus, a broader range of abilities in the current sample may have resulted in a higher correlation.

The second purpose of this study was to provide further support for the validity of the WJ-III Reading Fluency test as a valid test of reading fluency across grades. Ifthe WJ-III Reading Fluency test was more of a measure of comprehension rather than reading fluency, it would have been expected to see correlations decrease as grade level increased (Fuchs et al., 1993; Shinn et al., 1992). That was not, however, the case in this study as correlations remained high and fairly consistent across grade levels. These results, then, would appear to support the WJ-III Reading Fluency test as a valid measure of reading fluency despite grade level. However, it is still unclear as to its depth of reliance on comprehension skills due to a large comprehension component (i.e., requires comprehension-type questions to be answered).

Limitations and Future Research

As previously mentioned, one of the main limitations of this study was the small sample size and its limited power for generalization due to limited participant diversity. Future studies may wish to include more diverse samples, which would allow for better generalization of results. Future studies may also directly address the question of how much emphasis is placed on reading fluency versus comprehension on the WJ-III Reading Fluency test by directly comparing it to established measures of each construct across grade levels.

Conclusions

This appears to be the first study that has systematically compared DIBELS Oral Reading Fluency and the WJ-III Reading Fluency test across grade levels. These findings provide empirical support for the WJ-III Reading Fluency test as an appropriate measure of reading fluency. Furthermore, this allows school personnel another option for assessing reading fluency. It is particularly useful because the WJ-III Reading Fluency test may be used to test an individual child, whereas CBM-type measures would require class- or building-wide testing to provide norms.

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Appendix A

Letter of Approval from the Human Subjects Review Board

WESTERN KENTUCKY UNIVERSITY
Human Subjects Review Board
Office of Sponsored Programs
104 Foundation Building
270-745-4652; Fax 270-745-4211
E-mail: Phillip.Myers@Wku.Edu

In future correspondence please refer to HS05-041R, November 30, 2004

Kara Bletzinger
817 Springfield Blvd
Bowling Green, KY 42104

Dear Kara:

Your revision to your research project, "The Regional Science Resource Center" was reviewed by the HSRB and it has been determined that risks to subjects are: (1) minimized and reasonable; and that (2) research procedures are consistent with a sound research design and do not expose the subjects to unnecessary risk. Reviewers determined that: (1) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (2) selection of subjects is equitable; and (3) the purposes of the research and the research setting is amenable to subjects' welfare and producing desired outcomes; that indications of coercion or prejudice are absent, and that participation is clearly voluntary.

1. In addition, the IRB found that you need to orient participants as follows: (1) **Signed informed consent is required;** (2) Provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data. (3) Appropriate safeguards are included to protect the rights and welfare of the subjects.

   This project is therefore approved at the Full Board Review level.

2. Please note that the institution is not responsible for any actions regarding this protocol before approval. If you expand the project at a later date to use other instruments please re-apply. Copies of your request for human subjects review, your application, and this approval, are maintained in the Office of Sponsored Programs at the above address. Please report any changes to this approved protocol to this office. A Continuing Review protocol will be sent to you in the future to determine the status of the project.

Sincerely,

Phillip E. Myers, Ph.D.
Executive Director, WKURF,
Director, OSP and
Human Protections Administrator

c: Human Subjects FileBletzinger05-041R

Appendix B

Letter of Permission from the Superintendent to the Schools

Muhlenberg County Board of Education

510 WEST MAIN STREET
P.O. BOX 167
GREENVILLE, KENTUCKY 42345

PHONE 502-338-2871
FAX 502-338-0529

October 13, 2004

Kara Bletzinger
817 Springfield Blvd
Bowling Green, KY 42104

Dear Mrs. Bletzinger,

I have reviewed the proposal for you to contact parents of Muhlenberg county elementary school students through the teachers. I understand that the teachers will distribute information about your research and consent forms to parents of 1st, 3rd, and 5th graders. Students of those parents giving permission will individually receive two brief assessments of reading fluency. It is my understanding that efforts will be made to minimize disruptions to the classroom activities. You have my approval to proceed with your project.

Sincerely,

Russell Dale Todd

Russell Dale Todd
Superintendent

Appendix C

Letter to the Teachers

Kara Bletzinger
817 Springfield Blvd.
Bowling Green, KY 42104

December 8, 2004

Dear Teacher:

I am planning a reading research project to be conducted Jan. 5-7, 2005. The project has been approved by Mr. Todd and your principal, Ms. Boggs. This packet contains enough informative letters and consent forms for each of your students to take one home to his/her parent or guardian. The testing procedures being used will only take about 6 minutes for each student and will be conducted either just outside your classroom, or, with your permission, in your teacher center.

If you are willing to let your students participate, please send a copy of the letter and consent form home with them today. This is completely voluntary, but in order to stay on schedule and have an accurate count, it is important that the consent forms are signed and returned before Christmas break begins (Dec. 17). I will be checking in with you on Wed., Dec. 15 to pick up the forms that have already been returned. Every child who returns a signed form, regardless of the consent status will receive a small prize to be awarded at a later date. If you need to get in touch with me about questions or comments, please email me at kara.bletzinger@wku.edu or you may call me anytime at 270-792-1290.

Thank you so much for your time, help, and consideration!

Sincerely,

Kara Bletzinger

Appendix D

Consent and Assent Forms

January 5, 2005

Dear Parent/Guardian:

Your child is being asked to participate in a project that will be comparing two brief measures of reading. This study is being conducted by Kara Bletzinger and Dr. Carl Myers of Western Kentucky University. The University requires that you give your signed agreement for your child to participate in this project.

In this study, we will be looking at two commonly used forms of reading fluency assessment to see if they are measuring the same thing. The study will be conducted at your child's school during regular school hours and will only take six to eight minutes. Your child will individually be given the two forms of reading fluency assessment. On the first measure, your child will be asked to read three short grade-level passages aloud for one minute each. On the next measure, your child will have three minutes to read as many short statements as he or she can and indicate whether they are true or false. We will be working with your child's teacher to ensure the least amount of disruption from his or her regular school routine.

All information collected in this study will be kept strictly confidential and is accessible only to the project staff. Data will be identified with a code number, not your child's name. Only an overall summary of the results will be shared with school personnel, not individual results.

We emphasize that your child's participation in this project is completely voluntary. If you or your child decides not to participate, it will have no negative outcome for you or your child in any way. Your child may refuse to respond to any of the items and may withdraw from the study at any time. Although it is not possible to identify all potential risks in an experimental procedure, we anticipate no discomfort or risks as a result of your child's participation in this study.

The procedures in this study have been reviewed and approved by the Western Kentucky University Human Subjects Review Board. Any questions about this study may be directed to Kara Bletzinger at 270-792-1290, Dr. Carl Myers at 270-745-4410, or Dr. Phillip Myers at 270-745-4652. We urge you to call us if you have any questions.

We hope that you will allow your child to take part in our study. We promise to make it a pleasant experience for your child and to schedule the assessment session in cooperation with your child's teacher. Please fill in your child's name, your child's date of birth, and your child's teacher and grade level on the attached form. To indicate your consent, check the "yes" box, sign your name and fill in the date. Please return the attached consent form to your child's teacher by Tuesday, January 18. When your child returns this letter to the teacher, whether you check yes or no, your child will receive a small reward (e.g., pencil).

Thank you for your help.

Kara Bletzinger
School Psychology Graduate Student

Carl Myers, Ph. D., Supervisor
Associate Professor of Psychology

WESTERN KENTUCKY UNIVERSITY
PARTICIPANT CONSENT FORM

Child's Name: _____ Date of Birth: _____

Teacher's Name: _____ Current Grade Level: _____

_____ No, I do not give my consent for my child to participate in this study.

_____ Yes, I have read the information provided about his study, and give my consent for my child to participate in the study conducted by Kara Bletzinger and Dr. Carl Myers of Western Kentucky University. I understand that my child or I may withdraw from the study at any time without penalty.

_____ _____
Parent/Guardian Signature Date

*Please return this form to your child's teacher by Tuesday, January 18, 2005. When this form is returned, whether it is checked yes or no, your child will receive a small reward.

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY HUMAN SUBJECTS REVIEW BOARD
Dr. Phillip E. Myers, Human Protections Administrator
TELEPHONE: (270) 745-465

INFORMED ASSENT DOCUMENT
FOR RESEARCH INVOLVING MINORS

I, _____, understand that my mom or dad has said it is okay for me to take part in a project about reading under the direction of Kara Bletzinger.

I am taking part because I want to. I have been told that I can stop at any time I want to, and nothing will happen to me if I want to stop.

Signature: _____ Date: _____